

**APPENDIX A**

The following are marked up versions of the replacement claims indicated in the Amendment and in accordance with 37 C.F.R. § 1.121. Applicants have used the convention underline to indicate added text and [square brackets] to indicate deleted text.

1. (Twice Amended) An optical logic circuit, comprising:  
a substrate comprising a first material;  
an optical layer overlaying the substrate at least partially comprising a second material, the optical layer configured to provide a plurality of optical pathways, at least one optical pathway configured to transmit an optical bias signal, at least one optical pathway configured to provide an optical input signal, and at least one optical pathway configured to provide an optical output signal; and  
an interference region at least partially comprising the second material, configured to selectively cause interference of wavefronts of the optical bias signal and the optical input signal entering the interference region, the interference being caused by the distance between the optical pathway configured to transmit the optical bias signal and the optical pathway configured to provide the optical input signal, at the entrance to the interference region,  
wherein the optical output signal is representative of a Boolean logic output based on the at least one optical input signal and the optical output signal exits an interference region output.

11. (Twice Amended) An optical logic gate for an optical processor, comprising:  
a substrate configured of a first material;  
a patterned optical layer overlying the substrate at least partially configured of a second material, the patterned optical layer providing a plurality of optical conduits of the second material, at least two of the optical conduits configured to receive optical input signals, at least one of the optical conduits configured to provide optical output signals, and at least one of the at least two optical input signals being an optical bias input signal; and

an interference region coupled to at least two of the optical conduits configured to receive optical input signals, the at least two of the optical conduits entering the interference region and being separated by a distance, the distance causing selective interference along a predetermined axis in the interference region and coupled to at least one of the optical conduits configured to provide optical output signals,

wherein the interference region is configured to provide a Boolean logic output signal based on the at least one optical input signal.

31. (Twice Amended) A method of providing a Boolean logic optical output signal based on at least two optical input signals, comprising:

providing a first selective optical input signal to a first optical input;

providing a plurality of optical pathways formed of optical transmission material patterned on a substrate material;

providing a second selective optical input signal; and

providing [at least a portion] a distance between the plurality of optical pathways [to be configured to] entering the interference region, the distance being predetermined to selectively cause interference between wavefronts of the first selective optical input signal and the second optical input signal along a predetermined axis in the interference region; and

providing an optical output signal, the optical output signal based on the at least two input signals and representative of a Boolean logic function.

36. (Twice Amended) An optical logic circuit, comprising:

a substrate comprising a first material;

an optical layer overlaying the substrate at least partially comprising a second material, the optical layer being patterned to provide a plurality of optical pathways, at least two optical pathways configured to provide optical input signals, and at least one optical pathway configured to provide an optical output signal; and

an interference region configured to selectively cause interference of wavefronts of light from the optical input signals entering the interference region by

having the at least two optical pathways providing an input, being separated by a distance, the distance being predetermined to cause interference along a predetermined axis in the interference region;

wherein the interference region is configured to provide a Boolean logic output signal based on the at least two optical input signals.